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Big Data: The Future of Information and Business

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Executive Summary

BIG DATA HAS become a catchall phrase, but at its heart, it offers three challenges for organizations. First, business leaders must deploy new technologies and then prepare for a potential revolution in the collection and measurement of information. More important, the entire organization must adapt a new philosophy about how decisions are made, if the real value of big data is to be realized.

The amount of data pouring into organizations through ever-expanding channels is staggering. According to one source, more data have been produced in the past two years than in all of prior history. Not only has the volume of data changed, but so has the variety: information is now collected from multiple channels, ranging from Web clicks to the unstructured data from social media. And the velocity at which organizations can now collect, analyze, and respond to data has added a new dimension. Amazon, for instance, uses a dynamic pricing system that crawls over the Web, checks competitors' prices and product availabilities, and changes the prices on Amazon, in some cases every fifteen seconds. Amazon can collect data from every visitor, every click, and every interaction, which collectively are known as structured data, and it can also collect reviews or evaluations from consumers or their social media posts.

A second important aspect of big data is the potential in new forms of measurement. For instance, technology is already widely available that can automatically report vital health statistics to your doctors while you exercise. Likewise, GE embeds micro-transmitters such as sensors and networking technology to help customers with predictive maintenance of power turbines. Experts predict there will be an explosion of data that is generated through machine-driven measurement. The rate of this growth is even twice the growth of data from people. By 2015, it is expected that 6 billion objects in the world will be connected to the Internet, known as the Internet of Things. An example of possibilities of these new connections is Nest, a thermostat that allows your mobile phone's GPS to automatically notify your heating or air-conditioning system if you come in close vicinity of your home.

Finally, organizations must confront a new philosophy about decision-making. Today we live in an always-on world, where consumer preferences change even by the hour. They can cross channels at once and take a range of unusual and different paths to make a purchase. One analyst characterized the purchase path to look a lot more like the flight of a bumblebee than the predictable, serial, or linear purchase funnel of yesterday. This means that organizations must be prepared to deploy new channels for decision-making, some of them automated, that allow fast and agile responses to customer information. Likewise, the entire organization will face new pressure to make decisions based on data and quick experimentation rather than intuition and estimates.

Figure 1

Familiarity with the Concept of Big Data

How familiar are you with the concept of big data?

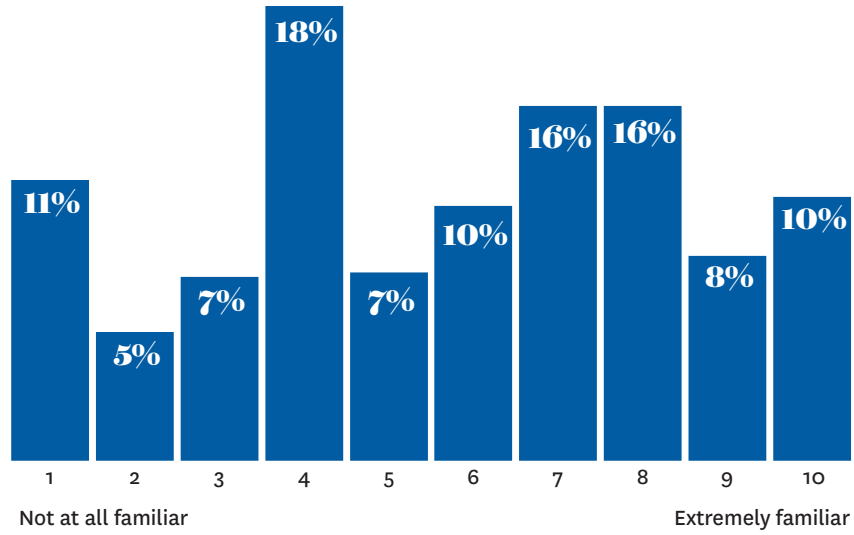
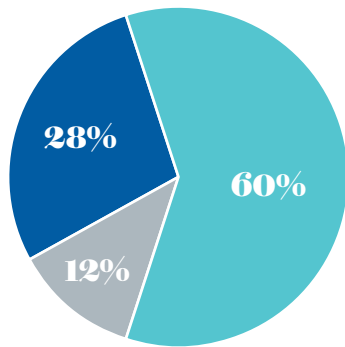


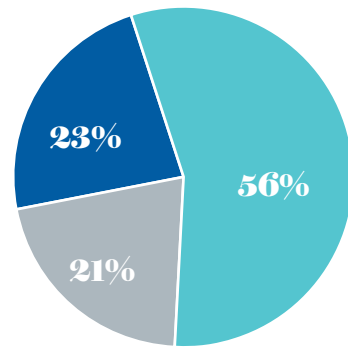
Figure 2

Current Use of and Strategy for Big Data

CURRENTLY USE BIG DATA?



HAVE STRATEGY FOR BIG DATA?



■ Yes
■ No
■ Unsure

Based on data collected by *Harvard Business Review* in an online survey of 951 members of the *Harvard Business Review* global audience of readers.

Clearly these three challenges are part of the evolution that has brought us to what *Harvard Business Review* author Tom Davenport has named “Analytics 3.0.” He says Analytics 1.0 were the pre-big data; Analytics 2.0 were the early days of big data, and now we “are entering the Analytics 3.0 world. It’s an environment that combines the best of 1.0 and 2.0—a blend of big data and analytics that yields insights and offerings with speed and impact.” The real win for businesses comes when companies can combine and analyze structured data from their enterprise applications with unstructured Web data and data from public or subscription sources. And that means companies will need to have both the analytic tools and the people with a new set of analytics skill to take full advantage of the data flow and make the most of predictive analytics.

In the following collection of essays, three *Harvard Business Review* authors—Thomas H. Davenport, Erich Joachimsthaler, and Bill Sweeney—present the future and immediate opportunities for business in big data and analytics. In the first article, Davenport presents the potential impact of big data and analytics, explaining how companies can benefit from faster and better decision-making and cost reduction that can support new forms of innovation. Joachimsthaler shares three case studies of companies that are winning right now by integrating big data and analytics with digital marketing. And last, Sweeney explains how big data and analytics will improve risk management by providing new ways to monitor, measure, and mitigate risk and potentially create competitive advantage.

Together these essays are designed to help organizations understand the opportunities and the challenges presented by big data and to begin to recognize how to leverage this new tool for real value.



Big Data: The Opportunity and the Challenge for Competitive Advantage

THOMAS H. DAVENPORT | President’s Distinguished Professor of Management and Information Technology, Babson College; Visiting Professor, Harvard Business School

If you’re like most of the managers and professionals I come across, you are certainly aware of the term “big data” and know that data has been growing at an amazing rate. But you may be a little fuzzy on what is actually different about big data and how it relates to traditional data management and analytics.

More important, most of your organizations aren’t doing much with it yet. In a 2013 survey of 951 *Harvard Business Review* readers, for example, many respondents said they were familiar with the concept of big data, but only 28% said that their organizations were “currently using big data to make better business decisions or create new business opportunities.” [figures 1 and 2](#)

Only 23% said their organizations had a strategy for big data. A quite small percentage, only 6%, strongly agreed that “My organization has considered the impact of big data on key functions within the business,” and an even smaller percentage, 3%, strongly agreed that “My organization knows how to apply big data to our business.” [figure 3](#)

Clearly there is a massive amount of data out there; according to one study, the world used over 2.8 zettabytes of data (that’s 2.8 trillion gigabytes—of course, an unfathomably large number) in 2012. This is more than anything we have ever known, and it will only become more voluminous over time.

Figure 3

Organizations' Attitudes About Big Data

Rate your level of agreement with each of the following statements.

1=strongly disagree; 10=strongly agree



Based on data collected by *Harvard Business Review* in an online survey of 951 members of the *Harvard Business Review* global audience of readers.

But to organizations needing to manage and take advantage of big data, the total volume isn't the point.

The point is not to be dazzled by the volume of data but rather to analyze it—to convert it into insights, innovations, and business value. The same study suggests that only half of 1% of the 2.8 zettabytes is analyzed in any way. That suggests that we have a huge task ahead of us to start analyzing the data and getting value from it. Not all of it will be useful—the study estimates that about 25% has potential value—but whatever the number, we are only scratching the surface of what's possible.

THE NEW OPPORTUNITIES FROM BIG DATA

Of course, if big data is to make substantial inroads into businesses, it must provide some new opportunities. Going on about how much data there is in Facebook or Twitter or the number of gigabytes in a single human genome doesn't help executives determine how much value they will achieve from exploiting big data.

There are three classes of value: cost reductions, decision improvements, and improvements in products and services. Cost reduction opportunities from big data are potentially quite substantial.

On the decision side, the primary value from big data derives from adding new sources of data to explanatory and predictive models. Many big data enthusiasts argue that there is more value from adding new sources of data to a model than to refining the model itself.

For example, if you have some data predicting customer attrition based on what customers have or haven't bought from you, you can probably improve it by adding data from their service transaction histories. If you have a model that predicts the "next best offer" that a customer is likely to buy, based on his or her purchase history and demographics, you can probably improve it by analyzing some of the customer's comments and likes on social media sites. Some of the extra data you may use will be "big" in that it's large volume or unstructured, but some will be small and/or structured. The key is to look broadly for new sources of data to help make your decision.

The other major new opportunity from big data is to create appealing products and services for customers. It's still early days for big data in general and for data-based products and services specifically, but there are many examples of desirable products and services deriving from big data. At LinkedIn, for example, one specific offering that has definitely provided value to that company is the People You May Know (PYMK) feature. As many readers will know from having used it, PYMK suggests to LinkedIn members



some other members whom they may want to connect with. PYMK employs a multifactor approach to identify possible new connections, including shared schools, workplaces, connections, and geographies.

PYMK has generated a lot of new customers for LinkedIn. Compared to the other prompts LinkedIn sent to get people to come back to the site, PYMK messages achieved click-throughs that were 30% higher. Millions of people paid repeat visits who would not have done so otherwise. Thanks to this one feature, LinkedIn's growth trajectory shifted significantly upward.

Similarly, the online travel systems company Amadeus has developed a big data service offering called "Featured Results." Faced with a business challenge of rising importance—the fast-increasing "look to book" ratio, or the number of online queries per airline ticket booking—Amadeus needed some way for travel distributors to make desirable offers to customers. Based on databases of user queries, several hundreds of millions of live airline prices, and half a billion reservation records, Featured Results presents four possible itineraries in which customers may be particularly interested. Early results of a beta test with Vayama, a travel agency partner of Amadeus, suggest that Vayama found a 16% improvement in its ratio of sales to searches.

Many executives may admit that big data has the potential to add substantial value to online businesses but are less sure of the value outside of that domain. They might be persuaded of the relevance to them by the actions and plans of GE—one of the world's largest and most successful companies and one of the most enthusiastic adopters of big data—even in industrial businesses.

GE has set up a center in the San Francisco Bay Area to address software and big data issues and is hiring lots of data scientists to do so. They will work on GE's traditionally data-intensive businesses, such as financial services and healthcare. But GE also sees potential value in industrial applications, such as in the company's locomotive, jet engine, and gas turbine businesses.

GE already monitors more than 1,500 gas turbines, used for energy generation, from a centralized facility, so much of the infrastructure is in place for using big data to improve performance. The company estimates that it could get at least a 1% improvement in efficiency of monitored turbines from software and network optimization, better dispatching of service, and improved gas/power system harmonization. This may not sound like much, but it would amount to \$66 billion in fuel savings over the next fifteen years.

GE is also thinking that big data-based optimization of service operations will work well for many of its other big-ticket industrial goods, including locomotives, jet engines, and healthcare imaging machines. Of course, other companies in those industries could adopt the same approaches, and they probably will someday. But GE's scale, ambitious investment plans, and early start in the big data area will probably confer considerable competitive advantage.

Big data changes not only technology and management processes but also basic orientations and cultures within organizations. We simply can't think about business in the same way with this new resource.

One needed change in orientation is toward more discovery and experimentation with data. The world—and the data that describe it—is in a constant state of change and flux, and those organizations that can recognize this and react quickly and intelligently have the upper hand. The prized business and IT capabilities are discovery and agility rather than stability. Data scientists working with big data tools and technologies will be able to continuously mine new and existing data sources for patterns, events, and opportunities at an unprecedented scale and pace. Those companies that can quickly analyze and adapt, using that data from internal and external sources, will be the clear winners.

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Driving New Growth Through Big Data

ERICH JOACHIMSTHALER | Erich serves as Managing Partner and Chief Executive Officer of Vivaldi's global consulting efforts, focused on marketing and brand strategy. He is the coauthor of *Brand Leadership* and author of *Hidden in Plain Sight: How to Find and Execute Your Company's Next Big Growth Strategy*.

Big data, big talk. There's so much hype about big data, it's hard to know what to believe. And what first comes to mind—sheer volume! Server farms! Data warehouses! IT infrastructure!—is not necessarily what matters most.

Don't get overwhelmed. Instead, consider three early case studies. Drawing lessons from these companies' experiences will make it easier to sort hype from substance and really understand what big data can do for your organization today.

THE BEVERAGE MAKER

This alcohol and spirits beverage maker markets in the southern part of Latin America and in Argentina, Chile, and Brazil through a highly fragmented channel and distribution system. Good point-of-sale data existed through large, urban supermarkets. But most purchase and consumption were taking place in smaller stores or side-of-the-road kiosks in rural areas or in bars and restaurants, where good and timely data were hard to come by.

The company hosted street sampling promotions, sponsored local events, and pushed its products at bars and restaurants but didn't do so with confidence. What were its top-volume outlets? How did prices compare with competitors'? Which brand should be promoted where?

The solution lay in mobile phone-enabled tracking that captures sales data from smaller vendors, bars, restaurants, etc., in real time. Regional management then integrated the data with its other channel data to create, for the first time, a comprehensive view of sales.

Now the company can micro-segment its market by sales opportunity and evaluate its coverage with confidence. It can also create digital scrapbooks to look more closely at point-of-sale episodes in groups, spot patterns, and spark insights that drive new activation.

Taking the next step, the company has also begun to integrate data provided by customers who track their consumption of the company's (and competitors') products, using a mobile phone-enabled diary. These data will help the company better understand the everyday context of customers' consumption and media behaviors; they will inform new product development and distribution channel decisions and further inform marketing efforts.

THE FASHION DESIGNER AND RETAILER

Burberry has built an enormous community of fans through digital and social marketing channels—over 20 million connections across ten social platforms, including over 15 million Facebook fans and over 1.5 million followers on Twitter. But a lot of companies have many fans and little profit to show for them. The difference is that Burberry has grown its fan base in large part by creating an attractive new path to purchase and a welcome opportunity to connect with others who are interested in fashion. Digital and social marketing aren't layered on top of a traditional business model. They are part of the new business model.

How does it work? The company makes videos and images of its new collections available to followers on Twitter and Facebook, even before the actual collections are shown onstage in fashion shows in Milan and London. As a result, these followers (many of them potential new customers in a new, younger target segment) are no longer “receiving” fashion; they’re participating. They can converse with others who are interested in fashion about likes, dislikes, and emerging trends. They can also buy what they’re seeing, cutting the traditional distribution line to guarantee that they receive the items as they’re produced, in about two months.

This path to purchase alone is a big deal in this industry. It is a new business model where customers pay months in advance before receiving the merchandise, a made-to-order approach reminiscent of the original, successful Dell model of selling computers. Equally interesting, however, is what else Burberry is doing with its 20 million connections. The company uses predictive analytics to analyze social activities of its fan base to better predict customer preferences, and it is delivering content based on actual conversations. It also mines data to create a seamless experience between social, digital, and mobile connections and physical stores. Sales associates armed with iPads can see what a customer has indicated in terms of preferences on the Web site and personalize a store visit accordingly. They can also unify the shopping experience across major digital, social, and physical channels so customers don’t experience a gap across touchpoints.

THE MAJOR LEAGUE SOCCER TEAM

The Kansas City Wizards reached the Major League Soccer championship game in 2006, yet the team had the league’s worst attendance and merchandise sales records. The club changed ownership and embarked on a turnaround, which included, in 2010, renaming the team Sporting Kansas City and opening a new stadium, Sporting Park. Seven years after the club changed hands, there is a waiting list for the team’s 14,000 season tickets, and the stadium has sold out twenty-seven games in a row, packing an average of 19,709 people into the stadium, which seats 18,467 (some tickets are standing room only).

The new name and new location visibly anchor the team’s rebirth. But big data is the invisible cornerstone. The stadium has a \$6 million, high-density wireless network with 220 miles of fiber (more than seven times the norm for a stadium its size) that powers social media connections among fans, stadium video boards, and advanced camera systems, and it makes for a more dynamic experience. A “Uphoria” app turns smartphones into in-stadium DVRs. Featuring new, state-of-the-art technology, the app lets fans stream live video from seven different camera angles and rewind the action from any point. It also lets users earn loyalty points by playing trivia games and predicting action on the field. It even lets Sporting Kansas City market hot dogs, jerseys, and tickets for future games.

The team is also collating data from ticket sales, merchandising, and more, integrating twenty former “data silos.” Using that information, Sporting Kansas City is tailoring its marketing, focusing more on young consumers instead of its previous family target, and building social currency by enabling app-powered sales, invitations, and discounts. As co-owner Robb Heineman said in a recent interview with *Bloomberg Businessweek*: “Our team is all about data; it is about collecting, repackaging, and utilizing that information to drive incremental revenue.”¹

BIG DATA VALUE, NO HYPE

These case studies suggest four thought-starters about harnessing big data’s potential:

- **Keep the end goal in mind with data gathering, digital marketing, and other technology-driven initiatives.** There are many intangible benefits of big data: better customer service, more engagement, a unified brand voice, and better customer insights. All are noble goals, and so are new technology features, such as an always on social media dashboard or a recommendation engine on your Web site. But nothing beats revenue growth. Focus on sales and work backward from there.

- **Think big, start small, scale fast.** Integrating data from different sources across touchpoints and channels requires big thinking, but this does not necessarily mean massive investments. You can start small. Tracking the actual sales from vendors was initially a small step for the Latin American beverage maker; the testing was done in a single city over a few weeks. This created real-time data that the company used to improve sales and delivery routes. With a proven model, the company then scaled up across the region and began integrating actual consumer data collected through mobile phone tracking.
- **Understand the power of real-time information.** Big data is not comparable to your last CRM project or ERP implementation effort. Daily vendor sales data helped the beverage maker adjust sales, delivery, logistics, and marketing and promotional programs immediately. Keep in mind, though, that your industry may be different. What will be meaningful for you? You may need to spot trends quarterly or every six months. Use big data to stay current, not to overwhelm or mislead.
- **Integrate big data into your overall marketing strategy.** In the past, marketers at the center developed strategy that was executed by operating entities, regions, or local units. Those at the center relied on surveys and studies commissioned from market research firms that prepared reports. Regional and local management, in contrast, focused on achieving operational efficiencies in executing strategies designed by the center in the previous planning cycle. Those days are over. Big data will prove that the traditional brand-centric thinking at headquarters (focusing on a big creative idea that can be executed consistently across all channels and touchpoints) is wholly inadequate today. Big data will shift decision-making to local and regional management and integrate their plans into the overall strategy process so that brand strategy and marketing plans can be truly designed, optimized, and executed locally.

A note of caution: big data raises the specter of consumer surveillance and privacy concerns. And those worries are legitimate. Still, companies and especially marketers need to work with data from consumers. The promise of big data is an empty promise unless consumers are willing to share information about themselves. They are the basis for many value-added services to consumers, with enormous consumer benefits, as the examples of Burberry and Sporting KC showed. And these are no exceptions.

Big data are essential for companies to create new business models, discover new consumer insights, optimize channel relationships, and create marketing efficiencies through better targeting and in improvements in managing campaigns and tracking success and ultimately to truly become customer-centric.

Keep two key principles in mind, though. First, focus on only what you need. There is a lot of water in the ocean, but you can't drink it all. Also know what is nice to know versus what you need to know. Ask consumers for permission to use the information you are collecting. Second, aggregate data at the micro-segment or group level to preserve individual privacy, and keep or store the data at that level.

At Vivaldi, we typically ask consumers for permission to track daily behaviors over their mobile phone. We then develop micro-segments and aggregate at that level additional data, including social conversations, digital browsing data, or internal CRM data. The highly personal and regular use of the mobile phone provides powerfully, contextually relevant big data to support marketing decisions anytime, and these data can be updated weekly, daily, or more frequently. Most important, big data changes how executives approach decisions. There is a lot less decision-making on gut feelings, experience, and intuition. Decisions are also made faster and acted on.

¹ Reeves Wiederman, "Sporting Kansas City Makes the Stadium More Like Your Couch," *Bloomberg Businessweek*, July 18, 2013.



Risk and Big Data

BILL SWEENEY | Bill Sweeney has thirty-five years of technology experience and has served as CTO for HSBC's IB, Sector CIO for Citigroup's IB, and Head of Research Technology for Bridgewater Associates. He is the founder of Risk, Data, and Analytics, a boutique consultancy focusing on those three areas.

Corporations around the world renewed their focus on risk management in the wake of the financial crisis of 2008. In the same period, big data became a business buzzword as technology created new ways to collect and quickly analyze huge streams of data to provide fresh insights and enable better decisions.

These trends have now clearly come together, as business leaders are exploring how big data can improve risk management by providing new ways to monitor, measure, and mitigate risk and even offer competitive advantage. Companies have always gathered data on everything from raw material supplies to cash on hand to sales patterns in order to measure and manage risk. But now big data provides the ability to measure more factors at a more granular level that allows us to discover patterns that are obscured in consolidated data.

Big data and analytics offer the promise to transform risk management and decision-making, providing more information and more speed. They won't solve every problem, however, and with these new sources of information come new pressures to focus risk management activities and respond quickly to perceived dangers.

Using big data, companies have the potential to better identify "hidden" risk and allow better root cause analysis. Risk managers can improve their ability to determine the probability of an event by leveraging metadata and using customer segmentation to identify risk factors. Big data can help develop better early warning indicators that will allow companies to mitigate risk more effectively.

For example, PayPal, the Internet-based payment and money transfer system, used innovative risk management techniques to significantly reduce the amount of fraud. The ability to significantly reduce fraud became a competitive business advantage. PayPal's techniques were so innovative that they were spun off into a separate company, Palantir.

Another company in the peer-to-peer lending business used big data to detect patterns of behavior that predicted relatively higher loan losses. The data included biometric metadata about customers during the online application processes, such as keystroke timing, patterns of spelling errors, and corrections. The data was used to detect patterns for high-risk and low-risk loans.

While segmenting customer bases is a well-understood and much-valued practice in marketing, companies now are turning to microsegmentation of their customer bases for risk management too. "Micro-segmentation" is the equivalent of "mass customization" in the retail space.

Companies are monitoring social media for information too.

For example, a large bank wants to monitor Twitter and Facebook for entries mentioning life-changing events. The theory is that postings about developments such as pregnancies, births, or marriages can become marketing opportunities for the bank. But the bank also wants to understand whether negative developments, such as announcements about an acrimonious divorce, will raise a flag that credit lines need to be carefully monitored or frozen.

“Big data and analytics offer the promise to transform risk management and decision-making, providing more information and more speed.” —Bill Sweeney

The use of external data to predict risk will become important to companies too. In the financial markets, analysts already closely watch and aggregate a wide range of statistical reports on areas that impact expectations and market reactions, such as unemployment, customer confidence, and GDP. Hedge funds and others have always tried to run before these publications by calculating the numbers independently. With big data there are companies now gathering fine-grained data that can help us build up a near-real-time picture of the world. A drop in FedEx shipments or an increase in eBay auctions, for example, may signal a drop in consumer confidence. Or could an uptick in Amazon Prime movie downloads indicate more people are staying home rather than going out and buying dinner and tickets to a movie?

These examples have one common theme: in order to effectively use big data for risk management—and gain competitive advantage—your company must be prepared to mitigate the risks quickly and actively as soon as you identify them. In most companies this adds new pressure.


I believe big data will transform *risk management* into simply *management*. The managers of the future will rely on big data and analytics to make risk decisions in real time rather than on risk management to provide a post-action oversight process. Risk management meanwhile will morph into defining the rules to be followed. A consequence of this transition will be the need to act faster to mitigate risk. In many cases the risk decision-making will be automated.

Another area destined to benefit is operational risk, especially with respect to early warning and proactive prevention. As companies apply fine-grained monitoring and measuring of the behaviors of employees, customers, and partners, the detection of fraud and internal errors will improve and other operational risks will be better monitored. Big data will allow managers to determine what their people are doing on a very detailed basis. As those behaviors are mapped to losses, managers will be able to focus on improving the “riskiest” behaviors.

As big data and analytics become part of running the business, the operational systems will be modified to leverage the knowledge gained. Banks today have real-time credit checks for credit card transactions, based on their risk systems. External-facing systems, such as Web sites, also have real-time risk management, focusing largely on fraud. As big data and risk management converge with day-to-day management, internal systems will build in the same types of controls.

The convergence of risk management and big data is not a panacea, of course. Automated risk management using big data introduces new risks. The mischievous and criminal will study “the machine” and find weaknesses. Alternatively, if fraud detection is built into an organization’s internal systems, such as by scanning email, instant messages, and social media, then determined fraudsters will avoid using technology. Don’t be blindsided because you believe your systems are capturing all of the risks.

Big data may also open up opportunities for miscreants too. Leverage big data to identify shopping patterns? Sure. Leverage big data to find susceptible targets for fraud? Why not? If you create a large repository of data, make sure it’s well protected and well monitored.



The implementation of big data, whether for fraud detection, improved security, or other well-intentioned benefit, creates another set of risks. Customers willingly provide personal information in return for better service and customized experiences. Implicit in that “trade” is the assumption of responsibility for safeguarding that information. Breaches of customer data damage client relationships and brands and have real concrete costs, such as crisis management, remediation, and free credit monitoring for all customers/employees. Companies that can be transparent about their collection and use of data while demonstrating that managing cyber-risk is a high priority will have a competitive advantage.

The migration of risk management via big data into an automated analytical process will be a tremendous benefit to your existing managers who understand the business today.

But there is a potential pitfall—new managers who are accustomed to “the machine’s” ability to prevent-crisis may not be as skilled in managing situations involving too many unknowns. Indeed, overreliance on big data or being overwhelmed by big data is a real possibility. A challenge with utilizing big data to manage risk is avoiding overconfidence because of the complexity and seeming thoroughness of the big data risk applications. It is important to maintain perspective.

At its heart, your operation consists of people who need to understand what’s happening. However, it is no longer possible for a person to absorb all of the available information. You must invest in visualization tools so that your people can make sense of it all.

And the final and most important thing to keep in mind—be careful what you’re not measuring. It’s easy with an expensive, complicated environment to think that everything is covered. However, big data analytics based on history often include assumptions that can change.

The confluence of risk management and big data offers tremendous opportunities for identifying and mitigating the risks you face. In some cases, big data will provide a competitive advantage. In other cases, investing in big data solutions will be the price to stay competitive. It’s important to think about the risks facing your business and focus on the ways that big data can significantly reduce your risks.



Sponsor's Perspective



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Big data means big opportunity for businesses and consumers. As the volume and variety of data increase at a rapid pace, the ability to successfully analyze the relevant data becomes increasingly important in order to unlock its significant value and transform the way businesses and consumers interact. For businesses, big data offers an opportunity to get a deeper understanding of their customers' attitudes, preferences, and behaviors and make every interaction more relevant, timely, secure, and profitable. For consumers, it is an opportunity to receive greater value through faster, more relevant, and personalized services from their banks, retailers, and other businesses.

While the opportunities are abundant, the variety of data types available—broadly categorized into structured, unstructured, and semi-structured data—underscores the complexity of the big data landscape. There are many new vendors who can process, manage, and aggregate big data, but the key is to find the right partner who can identify and connect the relevant data to analyze and turn into meaningful, actionable insights. As a trusted, proven expert in data and predictive analytics for over thirty-five years, Experian has partnered with clients to provide insight from data and to turn this insight into meaningful business decisions that foster sustainable growth. We work with clients across industries and markets to create and implement analytics-based customer strategies and marketing campaigns that can be quickly and easily deployed across all of the appropriate channels.

One of the most compelling examples of how big data and analytics can help businesses and consumers is in the area of fraud prevention. Take credit card fraud as an example. As fraudsters continue to evolve their credit card fraud schemes, card issuers and merchants can rely on new types of data sources, such as device information, transaction data, and consumer behavior data, to better manage fraud risk and increase consumer confidence that their purchases are safe and secure, which, in turn, drives increased revenues.

We hope you enjoyed this collection of articles. At Experian, we believe a tremendous win-win for consumers and businesses will come from big data. As the leading global information services company providing data and analytical tools to clients around the world to manage credit risk, prevent fraud, market across channels, and automate decisions, we are uniquely positioned to help consumers and businesses interact in trusted and more meaningful ways.

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